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(71) Applicant
Woodville Polymer Engineering Limited

(Incorporated in the United Kingdom)

**Alton Road, Ross-on-Wye, Herefordshire, HR9 5NF,
United Kingdom**

(72) Inventor
Martin George Clarke

(74) Agent and/or Address for Service
**J.K. Hogg
Dowty Group Services Limited, Patents Dept,
Arle Court, Cheltenham, Glos GL51 0TP,
United Kingdom**

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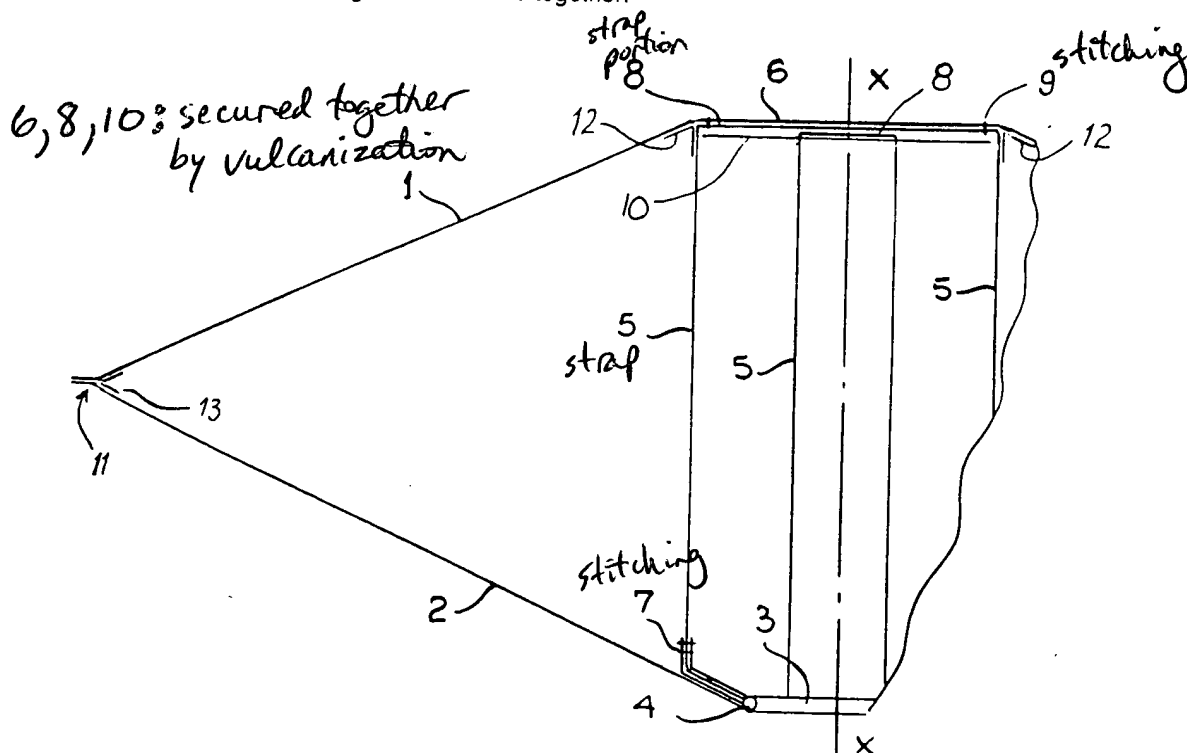
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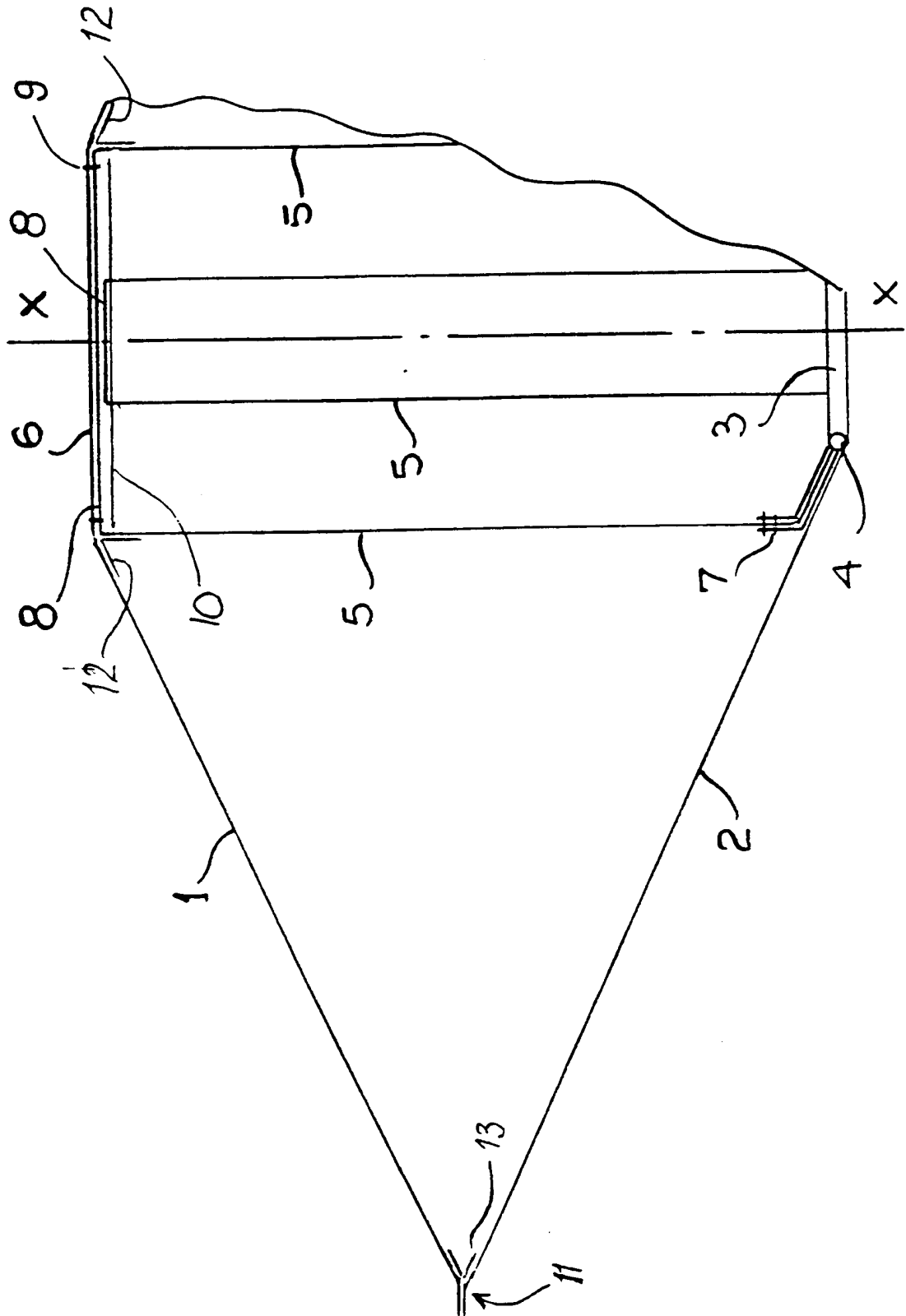
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(54) **A vehicle air bag with inflation control straps**

(57) The bag includes a gas retaining envelope 1, 2 and tie straps 5 located within the envelope 1, 2. The tie straps 5 are stitched with fine stitching 9 to a central portion 6 of the topline 11 which is closest to the occupant of the vehicle. The stitching within the envelope is covered and protected from hot inflating gases by a patch 10. In the event of a crash, the bag will inflate and the occupant will impact upon the topline 1 and the stitching 9 which, because it is fine, will not abrade the occupant. The patch, straps and bag are vulcanised together.



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INFLATABLE BAGS

This invention relates to an inflatable bag or cushion adapted to be used in a vehicle to protect an occupant against injury in the event of a crash by inflating rapidly so as to restrain forward movement of the occupant. Such bags or cushions are commonly known as vehicle crash bags.

Known vehicle crash bags are composed of pieces of composite rubber and textile material which are secured together to form an outer envelope with internal straps that act as ties to limit expansion of the bag and control its fully inflated shape. An additional piece of material, usually in the form of an octagonal patch, is provided internally of the bag to cover the straps and protect both straps and bag from heat damage caused by high gas temperatures when the bag is inflated rapidly. These pieces of material have been secured together by stitching, but this needs to be protected against heat damage internally, for example, by coating with a bead of RTV or similar material, and can also present an abrasion hazard externally for an occupant's face striking the bag under crash conditions.

As an alternative to stitching, the pieces of material that make up the crash bag have been secured together by vulcanisation which avoids all the above problems with stitching. However, vulcanised seams can open due to a process of de-lamination, especially under low temperature conditions.

An object of the present invention is to provide an improved crash bag in which the pieces thereof are secured together in a manner which is less vulnerable to heat damage or low temperatures and which reduces abrasion hazards.

According to the present invention, the outer material of a crash bag is secured to an internal tie strap by fine stitching, a heat protective patch is applied to cover the strap and stitching internally of the bag, and the outer material, strap and patch are vulcanised together.

The use of stitching serves to protect the connection between the outer material of the bag and the internal strap against failure due to de-lamination. However, the stitching need only

involve the use of fine grade thread, for example 30 grade thread as opposed to 20 grade thread normally used in the stitching of crash bags. This gives adequate strength without producing an abrasion problem. Further, by not stitching the protective patch, the stitching is protected from heat by the patch.

A crash bag according to the invention is illustrated in the accompanying drawing of a section through part of a crash bag. The bag comprises a topside 1 and an underside 2 which are secured together around their periphery at 11. The underside 2 is provided with a central aperture 3 at which the edge of the fabric is attached to a ring 4 by which the bag is connected to inflation means (not shown).

Two pairs of straps 5 are connected internally to the bag between the underside 2 and the central portion 6 of the topside 1 so as to limit expansion of the bag along the central axis X - X of the bag. Each pair of straps 5 is arranged on a plane through the axis X - X perpendicular to the other pair of straps. Further, each pair of

straps 5 is formed from a single length of material which is connected by stitching 7 at its free ends to the underside 2 on opposite sides of the ring 4, and which has an intermediate portion 8 fastened to the central portion 6 of the topside 1 by a single ring of fine stitching 9. This stitching employs grade 30 polyester thread. A heat protective patch 10 of octagonal shape is provided internally of the bag overlapping the two intermediate strap portions 8 and the central portion 6, and all of these are secured together by a vulcanisation process, the topside 1, the straps 5 and the patch 10 all being composed of suitable composite rubber and textile sheet material that can be joined by vulcanisation. A folded hinge member 12 is provided in the angle between each strap 5 and the topside 1 and is secured by vulcanisation so as to reinforce the joint therebetween. A similar folded hinge member 13 is provided between the topside 1 and underside 2 to reinforce the joint 11.

It will be appreciated that the stitching 9, because it employs fine grade thread, does not produce a significant abrasion hazard on the outer

surface of the central portion 6. If required, finer grade thread such as grade 50 can be used and has been found to give adequate strength.

* [Further, the protective patch 10 serves to cover the stitching 9 and protect it against heat damage.

CLAIMS

1. A vehicle crash bag comprising an outer envelope, at least one tie strap secured to an inner surface of the envelope by fine stitching and a heat protective patch applied to cover the fine stitching within the envelope, the envelope, strap and patch being vulcanised together.
2. A vehicle crash bag as claimed in claim 1 wherein a hinge member is provided in an angle formed between the strap and the inner surface.
3. A vehicle crash bag as claimed in claim 2 wherein the hinge member is vulcanised to the strap and inner surface.
4. A vehicle crash bag substantially as described herein with reference to and illustrated by the accompanying drawing.